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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/506,895

09/07/2004

Ichiroh Yamasaki

900-505

5426

23117

7590

11/07/2008

NIXON & VANDERHYE, PC

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ARLINGTON, VA 22203

EXAMINER

MOWLA, GOLAM

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

11/07/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/506,895

Applicant(s)

YAMASAKI ET AL.

Examiner

GOLAM MOWLA

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 July 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8, 10 and 11 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-6, 8, 10 and 11 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant's amendment of 07/09/2008 does not place the Application in condition for allowance.
2. Claims 1-6, 8 and 10-11 are pending. Applicant has amended claims 1, 6, 8 and 11, and cancelled claims 7 and 9.

Status of Rejections

3. Due to Applicant's amendment of claims 1, 6, 8 and 11, all rejections from the office Action mailed on 04/16/2008 are withdrawn. New ground(s) of rejection under 35 U.S.C. 102 and/or 103 is/are necessitated by the amendments.

Specification

4. The amendment filed on 07/09/2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the partial contact between the second conductivity type semiconductor layer and the front electrode is a **straight line** (figs. 1, 2, 5 or 6 shows that the contact between them is a point, and fig. 4 shows that the contact between them is a curvilinear line).

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 is indefinite because it requires the second conductivity type semiconductor layer to become thicker as it goes from convex to concave portion of the substrate. However, claim 4 depends on claim 1, which requires the second conductivity type semiconductor layer to become thinner as it goes farther from the contacted area (becomes thinner as it moves away from the convex portion). One of ordinary skill in the art is not clear as to how a layer can become thinner (as required by claim 1) and then thicker (as required by claim 4) at the same position. Applicant is asked to clarify.

7. Claim 11 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 11 requires the partial contact between the second conductivity type semiconductor layer and the front electrode to be a straight line, which is not disclosed

in the specification. Each of the figures show that the partial contact between the second conductivity type semiconductor layer and the front electrode is either a point (as shown in fig. 1, 2, 5 and 6) or a curvilinear line (as shown in fig. 4), not a straight line. Applicant is asked to provide support.

Claim Rejections - 35 USC § 102

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
9. Claim 6 is rejected under 35 U.S.C. 102(b) as being anticipated by Nishitani et al. (US 6023020).

Regarding claim 6, Nishitani discloses a method for manufacturing a photoelectric conversion device (see fig. 1 and 2; col. 3, lines 9-15) comprising:

- (a) forming a film (high-resistance film 6 or 7; see fig. 1 and 2; col. 3, lines 9-15; col. 3, lines 41-61; and col. 4, line 56 to col. 5, line 2) serving as a barrier against impurity diffusion on a semiconductor substrate (light absorbing layer 3 as shown in fig. 1; see col. 3, lines 16-24; and col. 4, lines 3-13) having convex and concave portions (see fig. 1) formed on its surface in such a manner that the film becomes thicker from the convex portion to the concave portion (see fig. 1 which shows layer 6 is thicker at the bottom and thinner at the top; see also fig. 2 which shows that high-resistance film is formed at the concave portion and therefore the thickness is largest and the thickness goes to zero as it moves towards the convex portion);

- (b) implanting second conductivity type impurities (window layer 4; see fig. 1 and col. 3, lines 25-32) into the semiconductor substrate (3) through the film (see fig. 2) to form a second conductivity type semiconductor layer (n-type as it forms PN junction with p-type substrate 3) on the surface of the semiconductor substrate (3);
- (c) forming a front electrode (transparent conductive film 5; see fig. 1 and 2) that is in contact with the convex portion (see fig. 1 or 2) which constitutes a part of the semiconductor substrate surface (electrode 5 is indirectly contacts the top surface of light absorbing layer).

10. Claims 1-5, 8 and 10-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakai et al. (US 6207890, as cited in previous office action).

Regarding claim 1, Nakai discloses a photoelectric conversion device (see fig. 11 and col. 1, lines 6-8) using a first conductivity type semiconductor substrate (n-type crystalline silicon substrate 1; see fig. 11 and col. 1, lines 40-51) having convex and concave portions (as shown in fig. 11) formed on its surface (col. 2, lines 19-23), the device comprising at least:

- a second conductivity type semiconductor layer (p-type amorphous silicon layer 3; see fig. 11 and col. 1, lines 40-51) formed on the surface of the first conductivity type semiconductor substrate (1) and being in contact with the first conductivity type semiconductor substrate (1) (layer 1 indirectly contacts layer 3);

- a front electrode (4) connected to the second conductivity type semiconductor layer (3) (see also fig. 11 and col. 1, lines 47-51);
- a rear electrode (back electrode 6) formed on the rear surface of the first conductivity type semiconductor substrate (1) (see col. 1, lines 50-51),
- the second conductivity type semiconductor layer (3) being partially in contact with the front electrode (4) and becoming thinner as it goes farther from the contacted area (layer 3 becomes thicker at the top a and thin on the bottom b as shown in fig. 11; see also col. 2, lines 2-11).

Regarding claim 2, Nakai further discloses that the convex portions of the semiconductor substrate (1) are arranged at given intervals (as shown in Figure 11) and the second conductivity type semiconductor layer becomes (3) thinner from the convex portions (from top a; see fig. 11) to the concave portions (to bottom b; see fig. 11) of the substrate (1) (col. 2, lines 5-9).

Regarding claim 3, Nakai further discloses that each convex portion has the front electrode (4) (as shown in Figure 11) (col. 1, lines 47-48).

Regarding claim 4, Nakai further discloses that the convex portions of the semiconductor substrate (1) are arranged at given intervals (as shown in Figure 11), and the second conductivity type semiconductor layer (3) become thicker from the top of the convex portions to the concave portions of the substrate (1) (Nakai et al. discloses that the second conductivity type semiconductor layer (3) being thinner on the bottom of the rounded portions, then it has been interpreted that it is thicker on the top) (col.2; lines 5-8).

Regarding claim 5, Nakai further discloses that each convex portion has the front electrode (4) (as shown in Figure 11) (col. 1, lines 47-48).

Regarding claim 8, Nakai discloses method for manufacturing a photoelectric conversion device comprising the steps of:

- (a) forming a film containing second conductivity type (2) impurities on a semiconductor substrate(1) as shown in Figure 6 having convex and concave portions formed on its surface in such a manner that the film becomes thicker from the convex portion to the concave portion(col.11; lines: 5-10); and
- (b) implanting second conductivity type impurities into the semiconductor substrate from the film to form a second conductivity type semiconductor layer (2) on the surface of the semiconductor substrate (1) (col.11; lines: 47-55); and
- (c) forming a front electrode (8) that is in partial contact (Examiner notes that the front electrode is indirectly contacts the concave portion of the second conductivity type semiconductor layer 2) with the concave portion which constitute a part of the semiconductor substrate surface as shown in Figure 7 (col.11; lines: 30-44).

Regarding claim 10, Nakai further discloses that the partial contact between the second conductivity type semiconductor layer (3) and the front electrode (4) is substantially a point (uneven rounded section make contact at a point) (Figure 1 & 11) (col. 13, lines 35-44).

Regarding claim 11, Nakai further discloses that the partial contact between the second conductivity type semiconductor layer (3) and the front electrode (4) is a curvilinear line (as depicted in Figure 1 at least part of the partial contact is a straight line, e.g. extreme leftmost contact or rightmost contact to up until the electrode concaves downward).

Response to Arguments

11. Applicant's arguments with respect to claims 1-6, 8 and 10-11 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that "in the device of Nakai, layer 3, identified by the Examiner as the claimed second conductivity type layer, is not in contact with substrate 1, identified by the Examiner as the claimed first conductivity type substrate, since an intervening layer 2 is formed between substrate 1 and layer 3" (see Remarks, page 3).

Examiner asserts that there not a direct contact between the substrate 1 and layer 3, however, they are indirectly contact each other, and therefore anticipates the instant claims (see the ground of rejection as provided above).

Applicant also argues that "the electrode 4 in Fig. 4 of Nakai is not in partial contact with the convex portion which constitutes a part of the semiconductor substrate" (see Remarks, page 3).

Examiner asserts that there not a direct contact between convex portion of the substrate 1 and electrode 4, however, they are indirectly contact each other, and therefore anticipates the instant claims (see the ground of rejection as provided above).

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence/Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GOLAM MOWLA whose telephone number is (571) 270-5268. The examiner can normally be reached on M-F, 0900-1700 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ALEXA NECKEL can be reached on (571) 272-1446. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795